KEY to QUESTIONS & ANALYSIS

QUESTIONS TO ANSWER

1. Lactose is a disaccharide type of sugar. It is made up of two subunits of monosaccharide sugars - galactose and glucose

2. The results of the test indicated the breakdown of lactose by the enzyme lactase.

3. Hydrolysis is the chemical reaction in which a bond is broken by the addition of a water molecule. One part of the molecule takes the OH and another part takes the H atom. The result is two separate molecules.

4. the hydrolysis of lactose.

5. galactose and glucose

6. the lactase enzyme acts on the beta linkage bond and causes the disaccharide lactase to break by hydrolysis

7.From the pedigree charts it appears that lactose intolerance is an autosomal recessive trait in a family. Children who inherit two recessive genes will be lactose intolerant.

8. The data from the world map suggests that lactose tolerance may have had its beginning in certain tribes in Africa. It is also evident in Northern Europe.

9. The early American settlers were mainly from European countries.

10. The founder effect can be important in establishing the gene pool for an area being colonized. The early settlers may have been lactose tolerant and their descendants exhibit this trait. Later migrants to the U.S. were from other populations and were mostly lactose intolerant.

ANALYSIS

1. The symptoms of lactose intolerance include gas, bloating, and diarrhea. Since bacteria in the intestine receive an undigested quantity of lactose in the lactose intolerant person, the bacterial activity increases with this food supply. There may be a temporary increase in the production of gas by the bacteria.

2. The parents may have been heterozygous (Ll) in their genotype. Each may pass on a recessive gene to a child.(ll) 25% chance if they are heterozygous.

3.The process of evolution involves natural selection. A factor in the environment is responsible for the survival and reproductive succes of individuals with adaptive characteristics. Members of the population with an adapative advantage would be the more fit in terms of leaving more offspring. During periods of drought, cold weather, disease or other conditions affecting the success of crops, individuals who were lactose tolerant may have had an adaptive advantage. In those isolated popualtions they may have left more offspring with the lactose tolerant trait.

4. The earliest settlers in the United States were mostly descended from European countries, where cattle and dairy products were used a a main source of nutrition. Natural selection may have produced populations of lactose tolerant individuals there and when they migrated the founder effect established a gene pool of lactose tolerance.